

## Comparison of the Effect of Mono-Stage and Bi-Stage Acupressure at Sp6 Point on the Severity of Labor Pain and the Delivery Outcome

Marzieh Akbarzadeh<sup>1</sup>, MSc; Zahra Moradi<sup>2</sup>, MSc; Mohammad Javad Hadianfard<sup>3</sup>, MD; Najaf Zare<sup>4</sup>, PhD; Azam Jowkar<sup>5</sup>, MSc

<sup>1</sup>Community Based Psychiatric Care Research Center, Department of Midwifery, Fatemeh (P.B.U.H) School of Nursing and Midwifery, Shiraz University of Medical Sciences, Shiraz, Iran;

<sup>2</sup>Department of Midwifery, School of Nursing and Midwifery, Fasa University of Medical Sciences, Fasa, Iran;

<sup>3</sup>Department of Physical Medicine and Rehabilitation, School of Medicine, Shiraz University of Medical Sciences, Shiraz, Iran;

<sup>4</sup>Department of Biostatistics, School of Medicine, Shiraz University of Medical Sciences, Shiraz, Iran;

<sup>5</sup>Department of Midwifery, Fatemeh (P.B.U.H) School of Nursing and Midwifery, Shiraz University of Medical Sciences, Shiraz, Iran

### Corresponding author:

Marzieh Akbarzadeh, MSc; Department of Midwifery, Fatemeh (P.B.U.H) School of Nursing and Midwifery, Shiraz University of Medical Sciences, Nemazee Square, P.O.Box: 71345-1359, Shiraz, Iran

**Tel:** +98 711 6474250; **Fax:** +98 711 647425; **Email:** akbarzadehmarzieh@yahoo.com

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### ABSTRACT

#### Background

One of the most painful experiences of women in life is labor. The use of non-drug methods for pain relief is on the increase. This study aimed to compare mono-stage and bi-stage acupressure at sp6 point on the severity of labor pain and the delivery outcome.

#### Methods

This is a quasi-experimental single blind study from December 2010 to June 2011 in which 150 term pregnant women in labor pain were divided into 3 acupressure groups of mono-stage and bi-stage at sp6 point at 3-4 and 7-8 cm dilatation and control group. The intervention was carried out for a period of 20 minutes. Pain severity was evaluated before, immediately, 30 and 60 minutes after the intervention by Visual Analog Scale (VAS).

#### Results

The pain severity after the intervention in 3-4 cm dilatation in the intervention group was less than that of the control group ( $P=0.001$ ) but the two groups of intervention did not differ from each other ( $P=0.94$ ). In 7-8 cm dilatation, the pain severity was reduced only in the bi-stage intervention group ( $P=0.001$ ). The duration of the 2nd stage and the rate of Cesarean section was lesser in the intervention groups ( $P=0.022$ ).

#### Conclusion

Exerting pressure at sp6 point is effective in pain reduction, duration of labor and the rate of Cesarean section. Pain relief in bi-stage intervention was more than that of mono-stage. Therefore, it is used as an effective way to reduce maternal pain.

**KEYWORDS:** Acupressure; Labor pain; Duration of labor

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## INTRODUCTION

Childbirth in a woman's life is an important experience and the quality of this experience leaves short-term and long-term effects on them. Negative experiences give rise to emotional and mental problems and sexual disorders in the postpartum period and have dramatic effect on the emotional relationship of the mother and newborn. On the other hand, the fear and anxiety of labor will lead to an increase in surgical interventions. In order to lessen such interventions, the anxiety of labor should be substituted with a pleasant experience.<sup>1,2</sup>

In order to get rid of the labor pain, many women choose cesarean section. Childbirth as well as the physical complications for mother and baby (anxiety, stress, prolonged labor, abnormal fetal heart rate patterns and Apgar score)<sup>3,4</sup> can cause long-term mental disorders and jeopardize an individual's mental health.<sup>5,6</sup> So, pain management during childbirth is one of the important aspects of health care. The risk of maternal death due to cesarean section is 4-6 times as much as vaginal delivery. In comparison with vaginal delivery, cesarean complications rise sharply. The main causes of complications are endometritis, bleeding, urinary tract infection and non-fatal thromboemboli. Numerous reports of Orbiscan palsy and other long bone fractures do exist in infants born with cesarean section.<sup>7</sup>

In a survey of the effects of massage on blood oxytocin levels, researchers reported that after anxiety and increased stress hormone levels, oxytocin concentrations decreased and duration of labor increased.<sup>8</sup>

Prolonged labor causes anxiety, fear and fatigue and will raise possible injury, prenatal mortality, use of oxytocin and delivery by cesarean section and instrument.<sup>9,10</sup> Therefore, reduction of labor pain seems necessary not only for relieving pain but also for reducing the effects of physiological processes followed by anxiety and pain which is initiated in mothers and lead to maternal and fetal injuries.<sup>11</sup>

According to World Health Organization, one of the principles that should be included in the mother-friendly hospital protocol is non-pharmacological methods of pain relief in labor. In recent years, researchers and physicians have come to the conclusion that to decrease pain severity, one should resort to safe and secure methods for the mother and fetus which while being effective, cause no disorder in the process of delivery, maternal intelligence, pushing reflex and maternal physiological actions. All of these complications are observed more or less after using drugs for this purpose. Thus, in the past decade, many studies in the field of alternative medicine in pregnancy have been performed. Among all the used methods for pain relief in labor, non-pharmacological methods are superior to pharmacological methods due to the low cost, easy administration, non-invasiveness, establishment of confidence, and participation of patients.<sup>10,12</sup> One of the non-drug methods is acupressure which works on the basis of acupuncture.

Multiple pressure points which induce and reduce labor pain exist in the body and it is believed that on one hand by stimulating these points, oxytocin is released from the pituitary gland, which stimulates uterine contractions and as a result progresses the labor and on the other hand, energy is balanced and labor pain is reduced.<sup>13</sup>

Acupressure increases the uterine muscle activity and uterine contractions by decreasing adrenaline and noradrenalin and increasing endorphin and oxytocin, and can affect the delivery duration.<sup>14</sup>

Sanyinjiao Point (SP-6), as one of the points used in acupuncture and acupressure, is located four finger widths above the tip of the medial malleolus (the shin bone on the inside of the ankle); stimulation of this point regulates the sense and uterine function.<sup>2</sup>

According to a study conducted by Lee, gentle stimulation of Sanyinjiao Point (SP-6) for 30 minutes during uterine contractions reduces anxiety and pain in women without affecting PH umbilical vein and the first

and fifth minute baby's Apgar.<sup>2</sup> Chao et al, in their study, reported that application of TENS on acupuncture points reduces labor pain only and has no effect on the duration of the first stage of labor.<sup>15</sup>

Moreover, in most studies intervention has been done only in the early active phase of labor, while labor intensity is much higher in the active phase of labor. In previous studies, it has been unclear whether the analgesic effect of acupressure remains to late delivery or not. Therefore, there was an attempt in this study to compare the effect of acupressure in SP-6 point on the pain intensity and labor in one-stage experimental intervention (early active phase of labor), with acupressure in SP-6 point in two-stage intervention in early and late active phase of labor.

## MATERIALS AND METHODS

### *Participants*

This is a quasi-experimental single blind study on 150 nulliparous term pregnant woman in labor who referred to Hafez and Shoushtari hospitals from December 2010 to June 2011. The sample size ( $\alpha=0.05$ , power=90%) was calculated using  $\Delta=\mu_1-\mu_2/6\sqrt{z}$ ,  $n=[2(z_1-\alpha/z+z_1-\beta)^2\Delta^2]/d^2$

The sample size was, 41 each group, but due to the possibility of loss, the number of samples in each group was considered 50. (Total 150)

The sampling used was purposive method. Inclusion criteria for all subjects were considered The first person to draw was put in the uni-stage intervention group, the second patients was involved in the two-stage intervention group, and three patients were in the control group

The first group was involved in a one-stage experimental intervention acupressure in SP-6 point, the second group underwent a two-stage SP-6 acupressure points, and the third group served as controls. SP6 is one of the most commonly used points. Because the point crosses the spleen, kidney and liver meridians, it can treat many conditions

associated with all the three organs as well as the gynecological and emotional conditions. Studies have shown that stimulating these points can also improve labor progress and reduce labor pain.<sup>2</sup> Interventions for all the samples were performed by a single investigator to avoid any possible bias. Since many parents attended a labor room, acupressure was performed for each group for one day in order to prevent interfering results.

Participants in the two groups were blind so that the two groups were not aware of other types of interventions, and only the researcher knew the kinds of intervention. The control group also underwent the practice of the acupressure points by touching rather than simply applying pressure.

This research was approved by the research ethics committee of Shiraz University of Medical Sciences. After taking written informed consent from mothers, this quasi-experimental single blind study was carried out on 150 pregnant women with term pregnancy while laboring. Inclusion criteria were: 1- Primiparous women aged between 18-35 years, single pregnancy with gestation age of 37-41 weeks, cephalic position of the fetus and being in the beginning of the 1<sup>st</sup> active phase (3-4 cm dilatation) or before that; 2- Lack of affliction with psychic and anatomic disorders and chronic diseases (cardiac and pulmonary diseases, blood pressure and diabetes); 3- No risky pregnancies; 4- No skin disturbances like eczema and epidermis infections; and 5 -Lack of using oxytocin for induction or supporting labor. Also, cases of the any type of maternal or neonatal problem that resulted in Cesarean or supporting contractions by Oxytocin were excluded from the study.

### *Procedure*

After dividing the participant into three groups, for the 1<sup>st</sup> group, acupressure intervention was done at sp6 in 3-4 cm dilatation of the cervix, 2<sup>nd</sup> group at sp6 point in 3-4 and 7-8 cm dilatation of the cervix, and the 3<sup>rd</sup> group was considered as

the control group. Routine care was done in the hospital for the study population, so there was no moral problem for the control group.

After vaginal examination by the researcher, exerting pressure was started at SP-6 point at the beginning of contraction at 3-4 cm dilatation of the cervix for the experimental groups of 1 and 2 and after 30 seconds of pressure, a 30 second rest was given while the thumb was still in contact with the acupressure point. This procedure was carried out for a period of 20 minutes. Vaginal examination was repeated every 2 hours and the 2<sup>nd</sup> stage of intervention in the 2<sup>nd</sup> group at 7-8 cm dilatation was re-exerted. All interventions were carried out by the same person. The severity of pain in both groups was evaluated before the intervention, immediately, 30 and 60 minutes after the intervention using VAS. Visual analog scale (VAS), a scale with 10 numbers, is interpreted as follows: No pain (0), mild (1 to 3), moderate pain (4 to 6), severe pain (7 to 9), and the worst pain possible (10).<sup>16</sup>

The validity and reliability of the scale has been confirmed in Molazem et al.'s study. The content validity was measured using Opinions experts' opinion and reliability using Cronbach's alpha formula which was proved to be 0.80.<sup>17</sup>

This severity was reevaluated for the 1<sup>st</sup> group only at 3-4 cm dilatation and for the 2<sup>nd</sup> group at 3-4 as well as 7-8 cm dilatation. Thereafter, the contact was carried out (without pressure) for a period of 20 minutes at SP-6 point in the control group and the severity of pain were evaluated before, immediately, 30 and 60 minutes after contact at both dilatations.

It was tried to create a specified limit of pressure in each test by repeating the exerted pressure and using digital scale. So, a pressure equal to 1710 mmHg under the thumb of the right hand and simultaneously a pressure equal to 1350 mmHg under the thumb of the left hand were measured. To prevent any bias, the interventions were carried out by the same researcher. All the

3 groups were compared with each other with respect to the duration of active phase and 2<sup>nd</sup> stage of delivery, delivery type and APGAR of the 1<sup>st</sup> and 5<sup>th</sup> minutes of the life of the neonate.

Data collecting tool consisted of demographic information form and the criterion of numerical grading of the pain. The content validity of the information form was determined. Research showed that the criterion of numerical grading for evaluation of the severity of pain had a good validity and has been frequently applied in various studies.<sup>18,19</sup>

#### *Data Analysis*

The collected data were analyzed after coding the concerned variables using SPSS software. Independent t-test and one way Analysis of Variance and Variance analysis of repeated measures were used to analyze the results of this study.  $P < 0.05$  was considered as significant.

## **RESULTS**

The results of this study showed that the mean age of the research samples was  $26.28 \pm 4.14$  years. Regarding education, 12.0%, 18.66%, 39.33% and 30.0% had primary, high school, diploma, and university education, respectively. The mean age of gestation among the research samples was  $38.55 \pm 0.64$  weeks. Three groups had no significant difference in age, level of education and pregnancy age. Three groups were compared as to the severity of pain at the time of entering the study and had no any significant statistical difference ( $P = 0.49$ ). The mean pain intensity and the results of tests performed to compare the three groups at different time periods are shown in table 1. At 3-4 cm dilatation, the severity of pain was significantly less among acupressure groups compared with the control group till one hour after the intervention. Using LSD multiple comparison test between each of the two test groups and control groups, we found a significant difference ( $P = 0.000$ ).



At 7-8 cm dilatation of the cervix, the severity of pain was reduced only in the 2<sup>nd</sup> group (7.12±1.28) who received the intervention and this reduction continued only for half an hour after the intervention. The results of one-way ANOVA revealed no significant differences between the three groups (P=0.001). Little pain reduction was observed in the control group only immediately after contacting SP-6 point.

The duration of active phase of delivery (hour) was 3.06±1.02 in the mono-stage intervention group, 3.04±1.08 in the bi-stage intervention group, and 3.61±0.67 in the control group, respectively (P=0.001). And in the second stage of labor (in minutes), it was 36.68±12.63, 37.40±15.1 and 40.44±20.13 in the mono-stage intervention group, bi-stage intervention group and control group, respectively (P=0.44).

One women (1%) in the intervention group and 5 (10%) in the control group gave birth to their neonate by Cesarean section (P=0.022). The mean Apgar score at the first minute was 9.0±0.45, 9.0±0.94 and 8.75±0.6 in the mono-stage intervention group, bi-stage intervention group and control group, respectively (P=0.12) and at five minutes it

was 10.0±0.00, in the mono-stage , bi-stage intervention group and control group, respectively (P=0.35). (tables 1 and 2)

**DISCUSSION**

Human labor pain is considerable and public efforts have been made to reduce or control pain. Regarding the findings of this study, the use of acupressure can be considered as an effective way to reduce labor pain. The results of the two experimental groups in which the intervention was done at 3-4 cm (P=0.001) and 7-8 cm dilatation of the cervix (P=0.001) showed a reduction in pain intensity after 30 and 60 min after the intervention. This result was consistent with that of Chang et al.<sup>17</sup> In this study, no significant difference was observed between pain intensity before and after the intervention at 10 cm dilatation.

In comparison between the two experimental groups at 3-4 cm dilatation of the cervix, , no significant difference was observed in the severity of pain. But at 7-8 cm dilatation of the cervix that was performed only in the second experimental group, a significant difference was observed in the pain intensity of the two groups.

**Table 1:** Comparison of the mean severity of labor pain before, immediately, 30 and 60 minutes after the intervention among the experimental and control groups at 3-4 cm dilatation.

Severity of labor pain Groups	Before intervention	Immediately after intervention	30 minutes after intervention	60 minutes after intervention	P value*
	mean±SD	mean±SD	mean±SD	mean±SD	
Mono-stage sp6(Group 1)	6.28±1.18	4.95±1.65	5.48±1.83	5.98±1.81	P=0.94
Bi-stage sp6 (Group 2)	6.30±1.21	4.92±1.59	5.42±1.66	5.92±1.74	
Mono-stage sp6(Group 1)	6.28±1.18	4.95±1.65	5.48±1.83	5.98±1.81	P=0.001
Control (Group 3)	6.24±1.70	6.18±1.91	7.06±1.87	7.90±1.84	
Bi-stage sp6 (Group 2)	6.30±1.21	4.92±1.59	5.42±1.66	5.92±1.74	P=0.001
Control (Group 3)	6.24±1.70	6.18±1.91	7.06±1.87	7.90±1.84	

\*P<0.05 was considered as significant

**Table 2:** Comparison of the mean severity of labor pain before, immediately, 30 and 60 minutes after the intervention among the experimental and control groups at 7- 8 cm dilatation

Severity of pain Group	Before intervention	Immediately after intervention	30 minutes after intervention	60 minutes after intervention	P value*
	mean±SD	mean±SD	mean±SD	mean±SD	
Mono-stage sp6(Group 1)	9.25±0.54	9.24±0.55	9.60±0.50	9.90±0.30	P=0.001
Bi-stage sp6 (Group 2)	9.24±0.43	7.12±1.28	7.58±1.20	9.52±0.54	
Mono-stage sp6(Group 1)	9.25±0.54	9.24±0.55	9.60±0.50	9.90±0.30	P=0.49
Control (Group 3)	9.26±0.54	9.04±1.04	9.57±0.88	9.90±0.46	
Bi-stage sp6 (Group 2)	9.24±0.43	7.12±1.28	7.58±1.20	9.52±0.54	P=0.001
Control (Group 3)	9.26±0.54	9.04±1.04	9.57±0.88	9.90±0.46	

\*P<0.05 was considered as significant

The result of the repeated measures test showed that the difference in the pain intensity in both 3-4 and 7-8 cm phases in the two groups was statistically significant. This shows that after both interventions, the mother's pain has been reduced. It can be concluded that with increasing the number of interventions, the frequency of analgesia in mothers increased.

In a study conducted by Lee et al in 2004 in Korea, the impact of the SP-6 acupressure on labor pain and length of labor was investigated. Baseline pain intensity was not significantly different before the intervention in the two groups. But immediately, 30 and 60 minutes after the intervention, the pain was significantly lower in the experimental group than the controls. Also, the duration of labor in the experimental group was significantly shorter than that in the control group.<sup>2</sup>

In a study carried out by Waters et al in 2003 in the United States, intervention was in the form of ice massage in the Hoku area. The massage lasted about 40 minutes, twenty minutes of ice massage on the right hand and 20 minutes on the left hand. Then again pain intensity was evaluated using the Visual Analogue Scale (VAS). Pain after the intervention was significantly lower than

that before the intervention.<sup>18</sup> The results of this study are consistent with those of Chao (2006), Lee (2004), M K Lee (2003), and Chang (2003) studies.<sup>2,13,15,20</sup>

While the above results show a decline in labor pain intensity with acupressure, in Wallis et al.'s study the results showed that with acupuncture, only in 2 out of 23 women undergoing the intervention the amount of pain during labor reduced.<sup>20</sup>

Reduction in pain immediately after touching in the controls is probably due to the psychological impact of the presence of the patient's loved ones. The results of a meta-analysis performed by Simkin et al demonstrated the effect of the presence of loved ones in labor on reducing the use of analgesics, epidural anesthesia practice, low Apgar score, vacuum extraction and forceps delivery and cesarean.<sup>21</sup>

In the experimental groups also the greatest decrease in pain occurred immediately after the intervention; this value was lower than that of the control group. This is both due to the psychological impact of the presence of loved ones and effect of acupuncture. This can be demonstrated that the effect of acupressure is not only due to the presence of loved ones but also due to the

use of specific mechanisms.

It is believed that stimulating these points on one hand can induce the release of oxytocin from the pituitary gland, stimulates uterine contractions and as a result progresses the process of labor and on the other hand balances the energy and reduces the labor pain.<sup>13</sup>

Gate control theory of pain can explain the effect of acupuncture pressure in this study in such a way that pressure activates the thick nerve fibers and causes the gate to be closed, thereby preventing the transmission of pain. Impulses affecting only thick fibers holds the gate, leading to decreased pain perception. When thick fiber impulses are stimulated artificially by pressure, vibration or ice, the gates will be closed tighter.<sup>22</sup>

Melzack et al revolutionized the understanding of pain and stated "pain is inherently more complex than simple receiving and recording".<sup>22</sup> Beyond the gate control theory of pain, they proposed their theory as "the "neuromatrix". Neuromatrix theory of pain suggests that pain is a multidimensional experience caused by characteristic "neurosignature" patterns of nerve impulses generated by a widely distributed neural network-the "body-self neuromatrix"-in the brain.<sup>23</sup> The multiple influences that create pain perception are generated from 3 parallel processing networks: sensory-discriminative (somatosensory components), affective-motivational (limbic system components), and evaluative-cognitive (thalamocortical components).<sup>24</sup> This theory explains the effectiveness of acupressure as a non-pharmacological method in pain (produced by multiple influences)relief.

Another objective of this study was investigating the effect of touch and pressure of SP-6 point on duration of active phase and the second stage of labor. According to the results of the present study, acupressure reduced the duration of the first stage of labor but had no effect on duration of the second stage of labor. Also one-stage or two-stage intervention causes no difference in reducing the duration of the first stage of

labor. The results showed that the first and fifth minute Apgar scores did not differ statistically in the three groups. It seems that the use of acupressure during labor has no neonatal complications, which is consistent with the findings of Lee and Chang's study.<sup>2,8</sup>

Several factors influence the impact of labor; individual differences in pain threshold, cultural and social factors, psychological factors, and women's lack of familiarity with these new methods of pain relief, etc. can influence the intensity of pain. These factors, as the limitations of this study, were outside the control of the researcher.

## CONCLUSION

The results of this study reveal that the use of acupressure points on the SP-6 could be propounded as one of the non-medicinal methods to reduce pain and shorten the active phase of labor (first stage). Repetition of the experiment with the two-stage intervention group (3-4 and 7-8 cm) showed greater reductions in pain intensity and longer analgesia for the mother. This method is a simple, non-invasive, safe, and cost effective ; it can be helpful in reducing labor pain.

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